

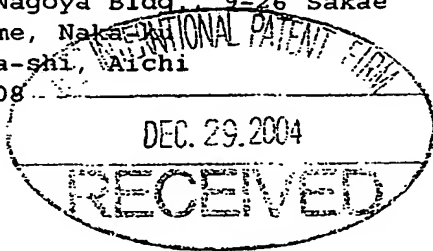
PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

ITEC INTERNATIONAL PATENT FIRM
Pola-Nagoya Bldg., 9-26 Sakae
2-chome, Nakagyo-ku
Nagoya-shi, Aichi
4600008
JAPAN



NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT AND
THE WRITTEN OPINION OF THE INTERNATIONAL
SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference FNTYA011WO	Date of mailing (day/month/year) 28/12/2004
International application No. PCT/JP2004/002016	FOR FURTHER ACTION See paragraphs 1 and 4 below
Applicant TOYOTA JIDOSHA KABUSHIKI KAISHA	International filing date (day/month/year) 20/02/2004

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes
1211 Geneva 20, Switzerland, Facsimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.
3. ☐ **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

- ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.
- ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. Reminders


Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until **30 months** from the priority date (in some Offices even later); otherwise, the applicant must, within **20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

<p>Name and mailing address of the International Searching Authority</p>  <p>European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016</p>	<p>Authorized officer</p> <p>Véronique Baillou</p>
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PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference FNTYA011WO	FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/JP2004/002016	International filing date (day/month/year) 20/02/2004	(Earliest) Priority Date (day/month/year) 19/05/2003
Applicant TOYOTA JIDOSHA KABUSHIKI KAISHA		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.



The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2. ☐ Certain claims were found unsearchable (See Box II).

3. ☐ Unity of invention is lacking (see Box III).

4. With regard to the title,



the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

5. With regard to the abstract,



the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regards to the drawings,

- a. the figure of the drawings to be published with the abstract is Figure No. 4



as suggested by the applicant.



as selected by this Authority, because the applicant failed to suggest a figure.



as selected by this Authority, because this figure better characterizes the invention.

- b. ☐ none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/JP2004/002016

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H01M8/04 H01M8/06 B60L11/18

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H01M B60L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6 475 655 B1 (DAIHATSU MOTOR CO., LTD.) 5 November 2002 (2002-11-05) Col. 4, lines 9-23 & 46-61; Fig. 29-32; Claim 9	1-11
A	PATENT ABSTRACTS OF JAPAN vol. 2002, no. 10, 10 October 2002 (2002-10-10) & JP 2002 184430 A (SHARP CORP.), 28 June 2002 (2002-06-28) cited in the application abstract	1-11
A	US 2002/025459 A1 (DAIMLERCHRYSLER AG) 28 February 2002 (2002-02-28) P. 2, paragraphs '0014!-'0015!; Fig. 1 & 2; Claims 1 & 10	1-11
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☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

& document member of the same patent family

Date of the actual completion of the international search

10 December 2004

Date of mailing of the international search report

28/12/2004

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Masson, J-P

INTERNATIONAL SEARCH REPORT

International Application No

PCT/JP2004/002016

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 343 679 A (INTERNATIONAL FUEL CELLS CORP.) 29 November 1989 (1989-11-29) Col. 2, lines 25-45; Fig. 1-4; Claim 1 -----	1-11
A	US 4 729 932 A (UNITED TECHNOLOGIES CORP.) 8 March 1988 (1988-03-08) Col. 2, lines 7-27; Fig. 4; Claims 1 & 6 -----	1-11
A	US 6 391 268 B1 (KVAERNER PROCESS SYSTEMS, INC.) 21 May 2002 (2002-05-21) Col. 2, line 58 - Col. 3, line 25; Fig. 1 & 2; Claims 1, 6 & 9 -----	1-10
A	US 4 400 253 A (COMBUSTION ENGINEERING, INC.) 23 August 1983 (1983-08-23) Col. 2, lines 27-57; Fig. 1; Claims 1, 14 & 15 -----	1-10

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/JP2004/002016

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 6475655	B1	05-11-2002	JP 2001006695 A	12-01-2001
			JP 2001023673 A	26-01-2001
			JP 2001085038 A	30-03-2001
			JP 2001093545 A	06-04-2001
			JP 2001093547 A	06-04-2001
			JP 2001102074 A	13-04-2001
			DE 10029468 A1	12-04-2001
JP 2002184430	A	28-06-2002	NONE	
US 2002025459	A1	28-02-2002	DE 10034399 A1	31-01-2002
			EP 1172872 A2	16-01-2002
EP 0343679	A	29-11-1989	US 4826742 A	02-05-1989
			CA 1318347 C	25-05-1993
			DE 68908605 D1	30-09-1993
			DE 68908605 T2	24-03-1994
			EP 0343679 A1	29-11-1989
			JP 2086071 A	27-03-1990
US 4729932	A	08-03-1988	NONE	
US 6391268	B1	21-05-2002	NONE	
US 4400253	A	23-08-1983	CA 1207018 A1	01-07-1986
			WO 9312856 A1	08-07-1993

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/JP2004/002016

International filing date (day/month/year)
20.02.2004

Priority date (day/month/year)
19.05.2003

International Patent Classification (IPC) or both national classification and IPC
H01M8/04, H01M8/06, B60L11/18

Applicant
TOYOTA JIDOSHA KABUSHIKI KAISHA

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☒ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



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D-80298 Munich
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Fax: +49 89 2399 - 4465

Authorized Officer

Masson, J-P

Telephone No. +49 89 2399-8728



**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

10/556006

International application No.
PCT/JP2004/002016

IC20 Rec'd PCT/PTO 14 NOV 2005

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ in written format
 - ☐ in computer readable form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in computer readable form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/JP2004/002016

Box No. II Priority

1. ☒ The following document has not been furnished:

☒ copy of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(a)).

☒ translation of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(b)).

Consequently it has not been possible to consider the validity of the priority claim. This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.

2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43*bis*.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.

3. ☐ It has not been possible to consider the validity of the priority claim because a copy of the priority document was not available to the ISA at the time that the search was conducted (Rule 17.1). This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.

4. Additional observations, if necessary:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-11
	No: Claims	
Inventive step (IS)	Yes: Claims	1-11
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-11
	No: Claims	

2. Citations and explanations

see separate sheet

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING
AUTHORITY (SEPARATE SHEET)**

International application No.

PCT/JP2004/002016

Re Item V

IC20 Rec'd PCT/JP 11 NOV 2003

The following documents, cited in the I.S.R., have been considered as relevant for the examination of the present application. Their numbering will be adhered to for the rest of the procedure.

- D1: US-B-6 475 6551 (DAIHATSU MOTOR CO., LTD.) 5 November 2002 (2002-11-05)
- D2: PATENT ABSTRACTS OF JAPAN vol. 2002, no. 10, 10 October 2002 (2002-10-10) & JP 2002 184430 A (SHARP CORP.), 28 June 2002 (2002-06-28)
- D3: US 2002/025459 A1 (DAIMLERCHRYSLER AG) 28 February 2002 (2002-02-28)
- D4: EP-A-0 343 679 (INTERNATIONAL FUEL CELLS CORP.) 29 November 1989 (1989-11-29)
- D5: US-A-4 729 932 (UNITED TECHNOLOGIES CORP.) 8 March 1988 (1988-03-08)
- D6: US-B-6 391 2681 (KVAERNER PROCESS SYSTEMS, INC.) 21 May 2002 (2002-05-21)
- D7: US-A-4 400 253 (COMBUSTION ENGINEERING, INC.) 23 August 1983 (1983-08-23)

I. Novelty

I.1 Document D1 discloses a fuel cell system comprising a fuel cell, a hydrogen supplying source, an oxygen-containing gas supplying source and a water removing means which can be selected from an electromagnetic valve, a pulsation pump and a supersonic generator (See Col. 4, lines 9-23 & 46-61; Fig. 29-32).

Document D2 discloses a solid polymer fuel cell including fuel gas and oxidizing agent gas passages in which a vibrating unit is provided to remove excessive water contents from the electrodes, said vibrating unit comprising a piezoelectric element and a diaphragm.

Document D3 discloses a method of operating a fuel cell system in which the water contained in the moist exhaust air of the fuel cell is removed from the exhaust air stream by means of absorption and then released again by subsequent desorption, whereby the released water can be returned fully or partially to the process (see P. 2, paragraphs [0014]-[0015]; Fig. 1 & 2).

Document D4 discloses a solid polymer fuel cell system which uses passive water

management to remove product water from the cells, whereby the product water is carried away from the electrolyte membrane by a porous cell plate component and moved through bubble barrier seals by means of reactant gas pressure in the cathode side of the cells (see Col. 2, lines 25-45; Fig. 1-4).

Document D5 discloses a fuel cell system comprising at least one individual fuel cell, each individual fuel cell comprising a barrier plate bounding one side of the individual fuel cell, an anode chamber, a cathode chamber, a solid polymer electrolyte membrane and a gas/water separator which includes a porous hydrophilic structure associated with the anode chamber and bounding the other side of the individual fuel cell (see Col. 2, lines 7-27; Fig. 4).

None of these documents discloses a fuel cell system having an electrostatic delivery module in at least one of the gas conduits to effectuate electrostatic delivery of water droplets out of said gas conduits, as presently claimed. **As a consequence, the subject-matter of claims 1-11 can be considered as novel over the content of documents D1-D5.**

- I.2 Documents D6 and D7 disclose electrostatic separation processes to remove emulsified water from oil (see Col. 2, line 58 - Col. 3, line 25 & Fig. 1-2 in D6; Col. 2, lines 27-57 & Fig. 1 in D7).

The subject-matter of present application differs from the separation systems disclosed in D6 or D7 in that the electrostatic delivery module used according to present application is composed of multiple electrodes that are arranged in at least one of the gas conduits of a fuel cell system. **Hence, the novelty of presently claimed matter according to claims 1-11 can be acknowledged with respect to D6 and D7.**

- I.3 As a conclusion, present claims 1-11 meet the requirements of Art. 33(2) PCT.

II. Inventive step

Document D1, which can be considered as the closest prior art, discloses a fuel cell system comprising a fuel cell, a hydrogen supplying source, an oxygen-containing gas supplying source and a water removing means which can be selected from an electromagnetic valve, a pulsation pump and a supersonic generator.

The problem to be solved by the present invention may be regarded as providing a fuel cell system that effectively removes the water content from the gas conduit by a simple structure.

The solution to the above named problem, provided by the present invention, consists in developing a fuel cell system having an electrostatic delivery module in at least one of the gas conduits to effectuate electrostatic delivery of water droplets out of said gas conduits.

As none of the prior art documents cited herein suggest the solution proposed by the present application, **presently claimed matter according to claims 1-11 can be considered as inventive** and said claims meet therefore the requirements of Art. 33(3) PCT.

III. Formal defects

1. Documents D1 & D3-D5 should be cited and briefly discussed in the description (Rule 5.1(a)(ii) PCT).